

(19)



JAPANESE PATENT OFFICE

PATENT ABSTRACTS OF JAPAN

(11) Publication number: **09046802 A**(43) Date of publication of application: **14.02.97** ✓

(51) Int. Cl.

B60L 1/02
B60H 1/22
(21) Application number: **07215147**(22) Date of filing: **31.07.95**(71) Applicant: **NIPPON SOKEN INC**
(72) Inventor: **ONIMARU SADAHISA**
INOUE TAKASHI
OKADA HIROSHI
(54) **HEATER FOR ELECTRIC VEHICLE**

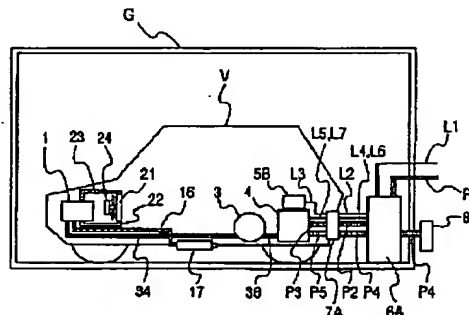
can be eliminated.

(57) Abstract:

COPYRIGHT: (C)1997,JPO

PROBLEM TO BE SOLVED: To eliminate infrastructure for supplying hydrogen by storing the hydrogen electrolyzed by from water by hydrogen generating means as fuel when a battery is charged by utilizing only a commercial power source.

SOLUTION: The heater for an electric vehicle comprises a hydrogen burner 1 at the front part of the vehicle V, warm water tubes 22, 23 for feeding combustion heat into a compartment, a heater core 21 and a fan 24 for feeding warm air into the compartment. The heater also comprises an exhaust tube 16 for combustion gas generated from the burner 1, and a muffler 17. A hydrogen storage unit 3 and a hydrogen supply tube 34 for feeding hydrogen to the burner 1 are provided at the center of the vehicle V. The unit 3, a hydrogen generating unit 4 and a controller 5B for controlling them are provided at the rear of the vehicle V. A water service tube P1 is connected to the unit 4 via a pipe P3 and a connector 7A, water for hydrolysis is supplied. Thus, heating is conducted only by easily obtainable water and commercial power source, and infrastructure for supplying hydrogen



* NOTICES *

Japan Patent Office is not responsible for any damages caused by the use of this translation.

1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. **** shows the word which can not be translated.
3. In the drawings, any words are not translated.

CLAIMS

[Claim(s)]

[Claim 1] A hydrogen-burning means to burn hydrogen. A hydrogen storage means to store the hydrogen supplied to this hydrogen-burning means. A hydrogen generation means to be the heating apparatus for electric vehicles equipped with the above, and to generate hydrogen by electrolysis from water, A hydrogen restoration means to fill up the above-mentioned hydrogen storage means with the generated hydrogen, and an electric power supply means to supply the power for electrolysis to the above-mentioned hydrogen generation means, A start of charge of the battery of an electric vehicle is characterized by making the hydrogen generation control means which control the above-mentioned electric power supply means so that the above-mentioned electric power supply means supplies power to the above-mentioned hydrogen generation means provide.

[Claim 2] It is the heating apparatus for electric vehicles which made the separable connecting means which the above-mentioned hydrogen generation means is carried in vehicles, and vehicles install independently the above-mentioned electric power supply means and the above-mentioned hydrogen generation control means in the heating apparatus for electric vehicles according to claim 1, and connect between the above-mentioned hydrogen generation means and the above-mentioned electric power supply means provide.

[Claim 3] It is the heating apparatus for electric vehicles which made the separable connecting means which vehicles install independently the above-mentioned hydrogen generation means, the above-mentioned electric power supply means, and hydrogen generation control means, and connect between the above-mentioned hydrogen generation means and the above-mentioned hydrogen restoration means in the heating apparatus for electric vehicles according to claim 1 provide.

[Claim 4] The heating apparatus for electric vehicles made into the structure of providing the negative electrode which you made it a soffit located up and arranged it from the above-mentioned free passage position in the claim 1 or the heating apparatus for electric vehicles given in three in two tanks which open the above-mentioned hydrogen generation means for free passage in the lower part, and one tank, and the positive electrode which you made it a soffit located up and arranged it from the above-mentioned free passage position in the tank of another side.

[Claim 5] The heating apparatus for electric vehicles set up so that the above-mentioned electric power supply means may begin to supply power to the above-mentioned hydrogen generation means, after make a water-supply means supply water to the above-mentioned hydrogen generation means, and a completion detection means of water supply detect that this water-supply means completed supply of the water of the specified quantity provide in a claim 1 or the heating apparatus for electric vehicles given in four and the above-mentioned water-supply means' completing supply of the water of the specified quantity in the above-mentioned hydrogen generation control means.

[Claim 6] The heating apparatus for electric vehicles which made the barrel made as [make / circulate / in a claim 1 or the heating apparatus for electric vehicles given in five, it is open for free passage with the above-mentioned hydrogen generation means, and introduce the oxygen which the above-mentioned hydrogen generation means generates with generation of hydrogen, and / the open air], and the ventilation means prepared in one open air inflow side of this barrel provide.

[Claim 7] The heating apparatus for electric vehicles which made a stirring means to stir the water which is supplied to the above-mentioned hydrogen generation means, and is used for it by electrolysis in a claim 1 or the heating apparatus for electric vehicles given in six provide.

[Claim 8] The heating apparatus for electric vehicles you made it located so that it is transmitted in the front face of the member which contacts with the water which the water-supply mouth into which the water used for the above-mentioned hydrogen generation means by electrolysis is made to flow in a claim 1 or the heating apparatus for electric vehicles given in seven is made to provide, and the water which flows the above-mentioned water-supply mouth from this water-supply mouth constitutes the above-mentioned hydrogen generation means, and is used by the above-mentioned electrolysis.

[Translation done.]

* NOTICES *

Japan Patent Office is not responsible for any damages caused by the use of this translation.

1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. **** shows the word which can not be translated.
3. In the drawings, any words are not translated.

DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[The technical field to which invention belongs] this invention relates to the heating apparatus for electric vehicles.

[0002]

[Description of the Prior Art]-Vehicles are equipped with the heating apparatus used for winter etc. Although the waste heat of an internal combustion engine is used by the vehicles which have obtained driving force from the internal combustion engine, energy efficiency of an electric motor cannot take out sufficient waste heat for good heating of the thing empty-vehicle interior of a room in an electric vehicle. Then, some heating apparatus for electric vehicles which do not use waste heat are proposed. For example, since the heating apparatus for electric vehicles using an electric heater or electric heat pump consumes the capacity of a battery, it has the problem that mileage decreases. Moreover, latent-heat-storage material is heated by the electric heater at the night which does not make it run vehicles, heat storage is carried out as the latent heat, and there is a fault to which structure becomes complicated with latent-heat-storage material and the peripheral device for accumulation and thermolysis, and the heating apparatus for electric vehicles which took out the above-mentioned latent heat through the heat exchanger at the time of a run has the amount of overlies fairly, and has the trouble of applying a burden to a battery etc. after all. The heating apparatus for electric vehicles which unlike these heating apparatus burns fuel and used the heat of combustion for heating does not apply a burden to a battery, but since a weight is not heavy, either, it is practical. although there are the gas oil currently generally used, a gasoline, LPG, etc. from the former as fuel to burn -- gas oil and a gasoline -- HC, CO, and NOx etc. -- exhaust air emission and CO2 generating -- LPG -- CO2 Since it generates, it is not desirable for earth environment. Since combustion gas is water, the point and hydrogen are fuel desirable for earth environment.

[0003]

[Problem(s) to be Solved by the Invention] However, although fuel can be easily supplied in a gas station etc. if it is the heating apparatus for electric vehicles which uses gas oil and a gasoline as fuel, the infrastructure equivalent to a gas station etc. is not fixed in the heating apparatus for electric vehicles which uses hydrogen as fuel. For this reason, the heating apparatus for electric vehicles which newly needs to fix the supply equipment which supplies the hydrogen as fuel to vehicles, and uses hydrogen as fuel was not practical.

[0004] Then, the hydrogen supply equipment as an infrastructure aims at offering the unnecessary and practical heating apparatus for electric vehicles which uses hydrogen as fuel in this invention.

[0005]

[Means for Solving the Problem] The heating apparatus for electric vehicles of the composition of the 1st of this invention A hydrogen-burning means 1 to burn hydrogen that hydrogen should be used as fuel practical only using the infrastructure of existing, such as a source power supply, as shown in drawing 1 and drawing 2 , A hydrogen generation means 4 to generate hydrogen from water by electrolysis further to the heating apparatus of the electric vehicle possessing a hydrogen storage means 31 to store the hydrogen supplied to this hydrogen-burning means 1, A hydrogen restoration means 32 to fill up the above-mentioned hydrogen storage means 31 with the generated hydrogen, An electric power supply means 61 to supply the power for electrolysis to the above-mentioned

hydrogen generation means 4, When the battery of an electric vehicle starts charge, hydrogen generation control-means 5A which controls the above-mentioned electric power supply means 61 so that the above-mentioned electric power supply means 61 supplies power to the above-mentioned hydrogen generation means 4 is made to provide (claim 1).

[0006] As the part is shown in drawing 2 that it should use in common by two or more vehicles, the above-mentioned hydrogen generation means 4 is carried in Vehicles V, Vehicles V install independently the above-mentioned electric power supply means 61 and the above-mentioned hydrogen generation control-means 5A, and the heating apparatus for electric vehicles of the composition of the 2nd of this invention possesses separable connecting-means 7A which connects between the above-mentioned hydrogen generation means 4 and the above-mentioned electric power supply means 61 (claim 2).

[0007] Separable connecting-means 7B which Vehicles V install independently the above-mentioned hydrogen generation means 4, the above-mentioned electric power supply means 61, and hydrogen generation control-means 5C with the 1st composition as the heating apparatus for electric vehicles of the composition of the 3rd of this invention is shown in drawing 5 and drawing 6 that the equipment carried in vehicles should be miniaturized, and connects between the above-mentioned hydrogen generation means 4 and the above-mentioned hydrogen restoration means 32 is provided (claim 3).

[0008] Two tanks 4A and 4B which are open for free passage in the lower part as the hydrogen which each above-mentioned hydrogen generation means 4 is easy composition, and is generated in electrolysis is shown in drawing 2 to make it obtain independently efficiently, Negative-electrode 44A which you made it a soffit located up and arranged it from the above-mentioned free passage position 431 in one tank 4A, and positive-electrode 44B which you made it a soffit located up and arranged it from the above-mentioned free passage position 431 in tank 4B of another side are provided (claim 4).

[0009] The heating apparatus for electric vehicles of the composition of the 4th of this invention A water supply means P1 to supply water to the above-mentioned hydrogen generation means 4 with each above-mentioned composition as shown in drawing 2 that it is automatic and should be made to perform generation of hydrogen, A completion detection means 51 of water supply to detect that this water supply means P1 completed supply of the water of the specified quantity is made to provide. After the above-mentioned water supply means P1 completes supply of the water of the specified quantity for the above-mentioned hydrogen generation control-means 5A, it sets up so that the above-mentioned electric power supply means 61 may begin to supply power to the above-mentioned hydrogen generation means 4 (claim 5).

[0010] The heating apparatus for electric vehicles of the composition of the 5th of this invention As it is shown in drawing 3 that it should prevent that high-concentration oxygen occurs with generation of hydrogen, are open for free passage with the hydrogen generation means 4 with each above-mentioned composition. The oxygen which the above-mentioned hydrogen generation means 4 generates with generation of hydrogen is introduced, and the barrel 81 made as [make / circulate / the open air] and the ventilation means 85 prepared in one open air inflow side 82 of this barrel 81 are made to provide (claim 6).

[0011] The heating apparatus for electric vehicles of the composition of the 6th of this invention makes stirring meanses 91 and 92 to stir the water W which is supplied to the hydrogen generation means 4 of each above-mentioned composition, and is used for it by electrolysis as the matter which deposits by electrolysis is shown in drawing 8 to make it dissolve efficiently at the time of the following electrolysis provide (claim 7).

[0012] The heating apparatus for electric vehicles of the composition of the 7th of this invention The water supply mouth 94 into which the water used for the hydrogen generation means 4 of each above-mentioned composition by electrolysis as the matter which deposits by electrolysis is shown in drawing 9 to make it dissolve efficiently at the time of the following electrolysis is made to flow is made to provide. You make it located so that the water which flows the above-mentioned water supply mouth 94 from this water supply mouth 94 may be transmitted to the front face of the members 43, 44A, 44B, and 95 in contact with the water W which constitutes the above-mentioned hydrogen generation means 4, and is used by electrolysis (claim 8).

[0013]

[Embodiments of the Invention]

(The 1st operation form) Drawing 1 shows the heating apparatus for electric vehicles of this invention, and Vehicles V are stored in the car barn G. The hydrogen-burning means slack hydrogen-burning machine 1, the warm water piping 22 and 23 for supplying the heat of combustion to the vehicle interior of a room, the heater core 21, and the fan 24 that sends warm air to the crew of the vehicle interior of a room are formed in the front part of Vehicles V. The combustion gas exhaust pipe 16 which discharges the combustion gas which occurs with the hydrogen-burning vessel 1 out of a vehicle, this, and the muffler 17 open for free passage are arranged in the lower part of Vehicles V. The hydrogen storage unit 3 is formed in the center section of Vehicles V, and the hydrogen supply pipe 34 which supplies hydrogen to the hydrogen-burning machine 1 from the hydrogen storage unit 3 is arranged in the lower part of vehicles. Behind Vehicles V, the hydrogen generation means slack hydrogen generation unit 4 connected with the hydrogen storage unit 3 by the hydrogen packed tube 36 and vehicles side control circuit 5B which controls these are prepared. The hydrogen generation unit 4 is connected with Vehicles V through dock 6A for hydrogen generation independently installed in the car barn G, and connector 7A prepared in the vehicles V rear face by the control signal lines L2 and L3, feeders L4, L5, L6, and L7, feed pipes P2 and P3, the oxygen exhaust pipe P4, and P5. The source power supply L1 and the water supply means slack water pipe P1 are connected to dock 6A. Outside the car barn G, the oxygen-pumping unit 8 which exhausts the oxygen generated as a by-product in the hydrogen generation unit 4 is formed.

[0014] Drawing 2, drawing 3, and drawing 4 explain further the above-mentioned heating apparatus for electric vehicles to a detail. The mixer 12 which mixes the open air with hydrogen is formed in the end side of the heat chamber 11 to which the above-mentioned hydrogen-burning machine 1 closed ends. The hydrogen storage means slack pressurized container 31 of the hydrogen storage unit 3 has connected with a mixer 12 through the hydrogen supply pipe 34. The hydrogen supply bulb 33 which opens and closes the hydrogen supply pipe 34 in the middle of the hydrogen supply pipe 34 is formed. And it is made to have led to the mixer 12 out of Vehicles V through the air supply pipe 14. The air pump 13 is formed in the middle of the air supply pipe 14, and the open air is introduced into a mixer 12. The exhaust port 15 is formed in the other end of the above-mentioned heat chamber 11, and it has connected with the combustion gas exhaust pipe 16. The muffler 17 is connected at the nose of cam of the combustion gas exhaust pipe 16.

[0015] The warm water passage 18 is established in the circumference of a heat chamber 11, the tap hole 181 of warm water is formed in the end, and the input 182 of warm water is formed in the other end. The end of the outward trip side warm water piping 22 has connected with a tap hole 181. The other end side of the outward trip side warm water piping 22 was prolonged to the vehicle interior of a room, and is connected to the entrance of the heater core 21. On the other hand, the water pump 19 is connected to the input 182 of the warm water passage 18, and it has connected with the heater core 21 through the return trip side warm water piping 23. The heater core 21 is approached, the fan 24 is formed, and the air which carries out a heat exchange with the heater core 21 is sent in crew's direction of a seat.

[0016] The hydrogen supply bulb 33, an air pump 13, and a water pump 19 operate by vehicles side control circuit 5B.

* NOTICES *

Japan Patent Office is not responsible for any damages caused by the use of this translation.

1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. **** shows the word which can not be translated.
3. In the drawings, any words are not translated.

PRIOR ART

[Description of the Prior Art] Vehicles are equipped with the heating apparatus used for winter etc. Although the waste heat of an internal combustion engine is used by the vehicles which have obtained driving force from the internal combustion engine, energy efficiency of an electric motor cannot take out sufficient waste heat for good heating of the thing empty-vehicle interior of a room in an electric vehicle. Then, some heating apparatus for electric vehicles which do not use waste heat are proposed. For example, since the heating apparatus for electric vehicles using an electric heater or electric heat pump consumes the capacity of a battery, it has the problem that mileage decreases. Moreover, latent-heat-storage material is heated by the electric heater at the night which does not make it run vehicles, heat storage is carried out as the latent heat, and there is a fault to which structure becomes complicated with latent-heat-storage material and the peripheral device for accumulation and heat dissipation, and the heating apparatus for electric vehicles which took out the above-mentioned latent heat through the heat exchanger at the time of a run has the amount of overlies fairly, and has the trouble of applying a burden to a battery etc. after all. The heating apparatus for electric vehicles which unlike these heating apparatus burns fuel and used the heat of combustion for heating does not apply a burden to a battery, but since a weight is not heavy, either, it is practical. although there are the gas oil currently generally used, a gasoline, LPG, etc. from the former as fuel to burn -- gas oil and a gasoline -- HC, CO, and NOx etc. -- exhaust air emission and CO2 generating -- LPG -- CO2 Since it generates, it is not desirable for earth environment. Since combustion gas is water, the point and hydrogen are fuel desirable for earth environment.

[Translation done.]

JAPANESE

[JP,09-046802,A]

CLAIMS DETAILED DESCRIPTION TECHNICAL FIELD PRIOR ART EFFECT OF THE
INVENTION TECHNICAL PROBLEM MEANS DESCRIPTION OF DRAWINGS DRAWINGS

[Translation done.]

*** NOTICES ***

Japan Patent Office is not responsible for any damages caused by the use of this translation.

1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. **** shows the word which can not be translated.
3. In the drawings, any words are not translated.

TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] However, although fuel can be easily supplied in a gas station etc. if it is the heating apparatus for electric vehicles which uses gas oil and a gasoline as fuel, the infrastructure equivalent to a gas station etc. is not fixed in the heating apparatus for electric vehicles which uses hydrogen as fuel. For this reason, the heating apparatus for electric vehicles which newly needs to fix the supply equipment which supplies the hydrogen as fuel to vehicles, and uses hydrogen as fuel was not practical.

[0004] Then, the hydrogen supply equipment as an infrastructure aims at offering the unnecessary and practical heating apparatus for electric vehicles which uses hydrogen as fuel in this invention.

[Translation done.]

* NOTICES *

Japan Patent Office is not responsible for any damages caused by the use of this translation.

1. This document has been translated by computer. So the translation may not reflect the original precisely.

2. **** shows the word which can not be translated.

3. In the drawings, any words are not translated.

MEANS

[Means for Solving the Problem] The heating apparatus for electric vehicles of the composition of the 1st of this invention A hydrogen-burning means 1 to burn hydrogen that hydrogen should be used as fuel practical only using the infrastructure of existing, such as a source power supply, as shown in drawing 1 and drawing 2 , A hydrogen generation means 4 to generate hydrogen from water by electrolysis further to the heating apparatus of the electric vehicle possessing a hydrogen storage means 31 to store the hydrogen supplied to this hydrogen-burning means 1, A hydrogen restoration means 32 to fill up the above-mentioned hydrogen storage means 31 with the generated hydrogen, An electric power supply means 61 to supply the power for electrolysis to the above-mentioned hydrogen generation means 4, When the battery of an electric vehicle starts charge, hydrogen generation control-means 5A which controls the above-mentioned electric power supply means 61 so that the above-mentioned electric power supply means 61 supplies power to the above-mentioned hydrogen generation means 4 is made to provide (claim 1).

[0006] As the part is shown in drawing 2 that it should use in common by two or more vehicles, the above-mentioned hydrogen generation means 4 is carried in Vehicles V, Vehicles V install independently the above-mentioned electric power supply means 61 and the above-mentioned hydrogen generation control-means 5A, and the heating apparatus for electric vehicles of the composition of the 2nd of this invention possesses separable connecting-means 7A which connects between the above-mentioned hydrogen generation means 4 and the above-mentioned electric power supply means 61 (claim 2).

[0007] Separable connecting-means 7B which Vehicles V install independently the above-mentioned hydrogen generation means 4, the above-mentioned electric power supply means 61, and hydrogen generation control-means 5C with the 1st composition as the heating apparatus for electric vehicles of the composition of the 3rd of this invention is shown in drawing 5 and drawing 6 that the equipment carried in vehicles should be miniaturized, and connects between the above-mentioned hydrogen generation means 4 and the above-mentioned hydrogen restoration means 32 is provided (claim 3).

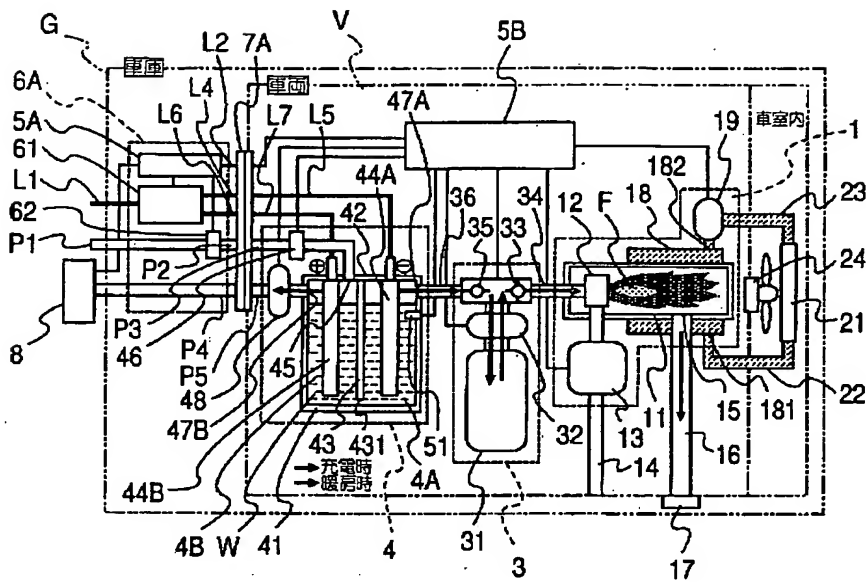
[0008] Two tanks 4A and 4B which are open for free passage in the lower part as the hydrogen which each above-mentioned hydrogen generation means 4 is easy composition, and is generated in electrolysis is shown in drawing 2 to make it obtain independently efficiently, Negative-electrode 44A which you made it a soffit located up and arranged it from the above-mentioned free passage position 431 in one tank 4A, and positive-electrode 44B which you made it a soffit located up and arranged it from the above-mentioned free passage position 431 in tank 4B of another side are provided (claim 4).

[0009] The heating apparatus for electric vehicles of the composition of the 4th of this invention A water supply means P1 to supply water to the above-mentioned hydrogen generation means 4 with each above-mentioned composition as shown in drawing 2 that it is automatic and should be made to perform generation of hydrogen, A completion detection means 51 of water supply to detect that this water supply means P1 completed supply of the water of the specified quantity is made to provide. After the above-mentioned water supply means P1 completes supply of the water of the specified quantity for the above-mentioned hydrogen generation control-means 5A, it sets up so that the above-mentioned electric power supply means 61 may begin to supply power to the above-mentioned hydrogen generation means 4 (claim 5).

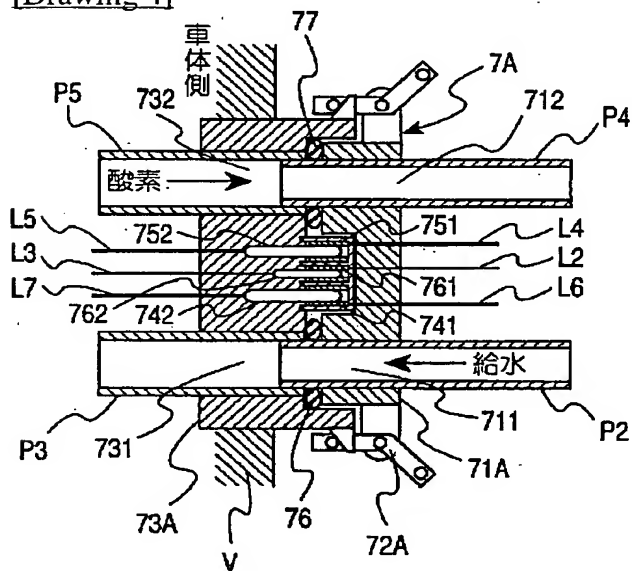
[0010] The heating apparatus for electric vehicles of the composition of the 5th of this invention As it is shown in drawing 3 that it should prevent that high-concentration oxygen occurs with generation of hydrogen, are open for free passage with the hydrogen generation means 4 with each above-mentioned composition. The oxygen which the above-mentioned hydrogen generation means 4 generates with generation of hydrogen is introduced, and the barrel 81 made as [make / circulate / the open air] and the ventilation means 85 prepared in one open air inflow side 82 of this barrel 81 are made to provide (claim 6).

[0011] The heating apparatus for electric vehicles of the composition of the 6th of this invention makes stirring meanses 91 and 92 to stir the water W which is supplied to the hydrogen generation means 4 of each above-mentioned composition, and is used for it by electrolysis as the matter which deposits by electrolysis is shown in drawing 8 to make it dissolve efficiently at the time of the following electrolysis provide (claim 7).

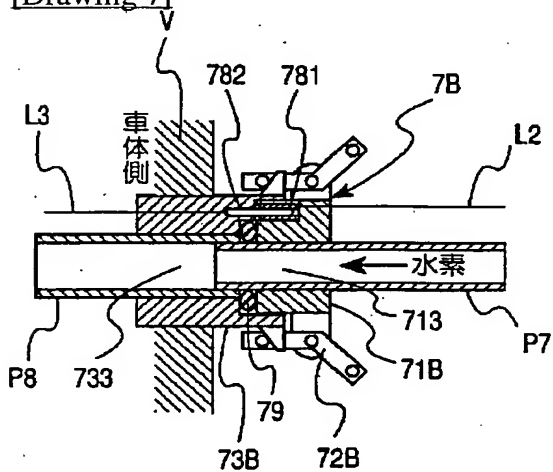
[0012] The heating apparatus for electric vehicles of the composition of the 7th of this invention The water supply mouth 94 into which the water used for the hydrogen generation means 4 of each above-mentioned composition by electrolysis as the matter which deposits by electrolysis is shown in drawing 9 to make it dissolve efficiently at the time of the following electrolysis is made to flow is made to provide.



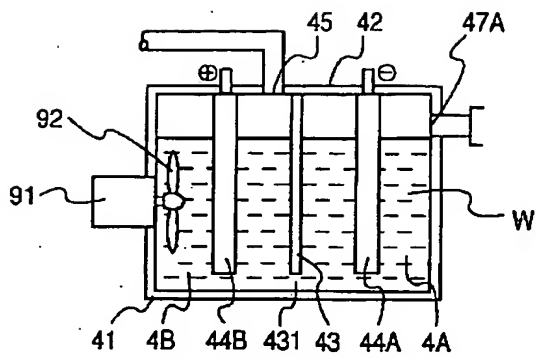
[Drawing 4]



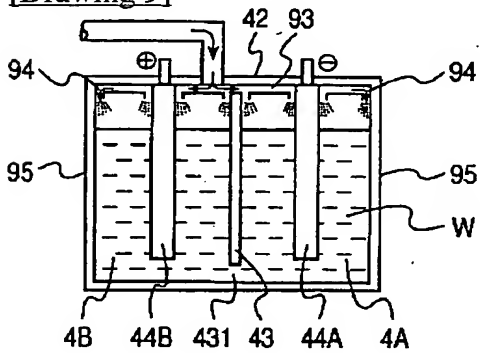
[Drawing 7]



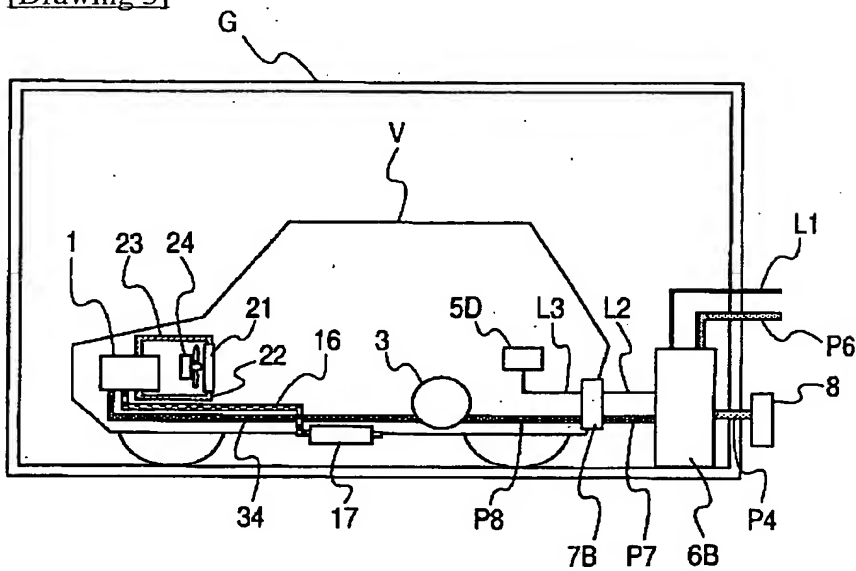
[Drawing 8]



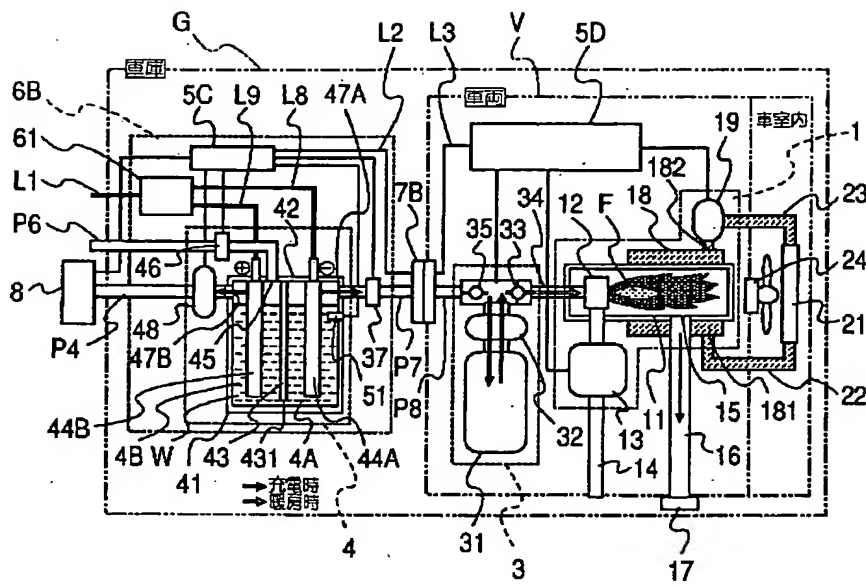
[Drawing 9]



[Drawing 5]



[Drawing 6]



[Translation done.]

* NOTICES *

Japan Patent Office is not responsible for any damages caused by the use of this translation.

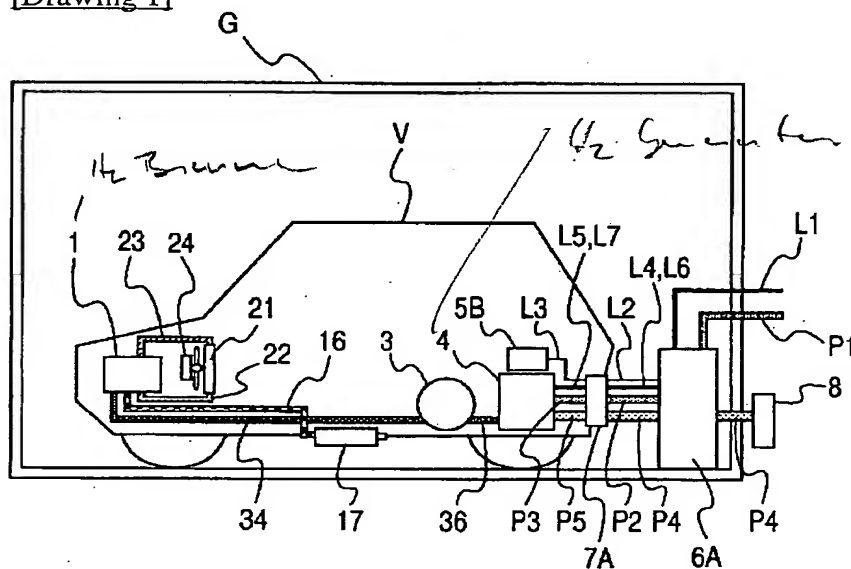
1. This document has been translated by computer. So the translation may not reflect the original precisely.

2. **** shows the word which can not be translated.

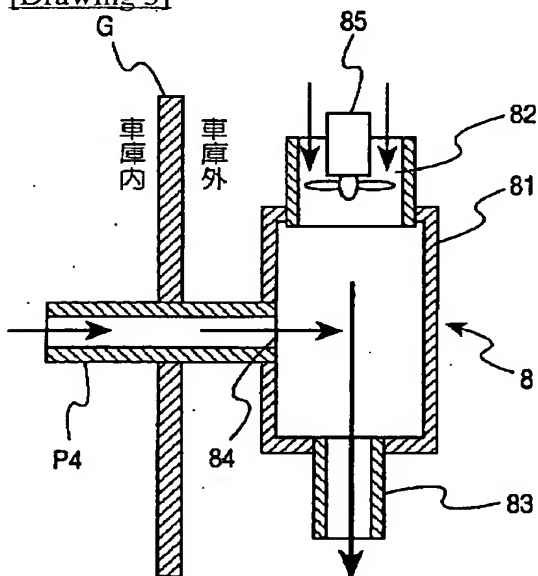
3. In the drawings, any words are not translated.

DRAWINGS

[Drawing 1]



[Drawing 3]



[Drawing 2]